# EXTRUSIVE INCISOR GROWTH IN THE RODENT GENERA *GEOMYS, PEROMYSCUS,* AND *SIGMODON*

Arthur J. Manaro
*University of Florida*

The rates of incisor growth in various rodents and lagomorphs have been studied by various workers since attention was directed to the growth of these teeth in *Rattus norvegicus* by Shadle, Wagner, and Jacobs in 1936. The upper incisors of *Oryctolagus* (Shadle, 1936), *Rattus losea* (Huruhata, 1940), *Cavia* (Shadle, Valvo, and Eckhart, 1938) and *Erethizon* (Shadle, Ploss, and Marks, 1944) have been found to grow between 2.65 and 4.54 inches annually while the lower incisors have an annual growth between 3.55 and 6.36 inches, each genus being fairly distinguishable from the others. More recently, Howard and Smith (1952) and Miller (1958) found that the western pocket gopher, *Thomomys,* had markedly higher rates than those animals previously studied, the differences presumably being due to the fossorial habits of those rodents.

The purpose of this paper is to present data on the rates of incisor growth in another geomyid species, *Geomys pinetus,* and two cricetid rodents, the cotton mouse *(Peromyscus gossypinus)* and cotton rat *(Sigmodon hispidus).*

The author is indebted to Dr. James N. Layne for his valuable assistance and helpful criticism in preparing this paper.

## Materials and Methods

Measurements were made on two individuals each of the three species studied. All of the animals were collected in the vicinity of Gainesville, Alachua County, Florida. The animals were housed in laboratory cages and fed a balanced diet of commercial rodent food, fresh greens, carrots, and potatoes. Incisor growth measurements and body weights were recorded at 7-day intervals. A file was used to make a transverse notch close to the gingival margin of one upper and one lower incisor and the distance between the notch and gum-line was recorded to the nearest 0.1 mm. by means of a vernier caliper. At each subsequent examination the distance between the previous notch and gingival was recorded and a new notch was made. Measurements were continued over a period of

28 days for each of the six animals except in the case of a female *Peromyscus gossypinus*. This animal, which was pregnant when captured and gave birth to young in captivity, was studied over an interval of 35 days to obtain data on the influence of lactation on incisor growth.

## Results

*Geomys pinetus* had the greatest absolute and relative incisor growth rates of the three species studied (Table 1). Growth of the upper incisor averaged 0.35 mm. per day while the lower incisor averaged 0.67 mm. per day.

TABLE 1
BODY WEIGHTS AND RATES OF EXTRUSIVE INCISOR GROWTH.

| Species and Individual | Body Weight (gms.) Mean | S.D. | Range | Upper Total mm/day | | Lower Total mm/day | |
|---|---|---|---|---|---|---|---|
| Peromyscus gossypinus No. 1 | 30.6 | 1.45 | 29.4- 32.8 | 3.8 | 0.14 | 9.9 | 0.35 |
| Peromyscus gossypinus No. 2 | 39.7 | 0.98 | 38.8- 40.9 | 4.2 | 0.15 | 9.6 | 0.34 |
| Sigmodon hispidus No. 1 | 171.5 | 9.64 | 159.5-184.6 | 6.2 | 0.22 | 10.1 | 0.36 |
| Sigmodon hispidus No. 2 | 133.8 | 4.45 | 128.6-140.1 | 4.6 | 0.16 | 10.3 | 0.37 |
| Geomys pinetis No. 1 | 106.5 | 6.69 | 96.6-114.4 | 10.2 | 0.36 | 19.6 | 0.70 |
| Geomys pinetis No. 2 | 99.6 | 2.60 | 97.4-103.1 | 9.4 | 0.34 | 18.0 | 0.64 |

Corresponding rates in the cotton rat were 0.19 mm. and 0.36 mm. and in the cotton mouse, 0.16 mm. and 0.34 mm. per day. No individual differences were noted except in the case of the two cotton rats where a significant difference existed in the growth rates of the upper incisors (Table 1). Whether this variation is attributable to the differences in body weights (Table 1) is questionable. Although the absolute rates of the pocket gopher and cotton rat were quite different, the differential growth rate of upper and lower incisors was 52 per cent in both species. The differential rate in the cotton mouse, however, was only 42 per cent, which is lower than any species reported.

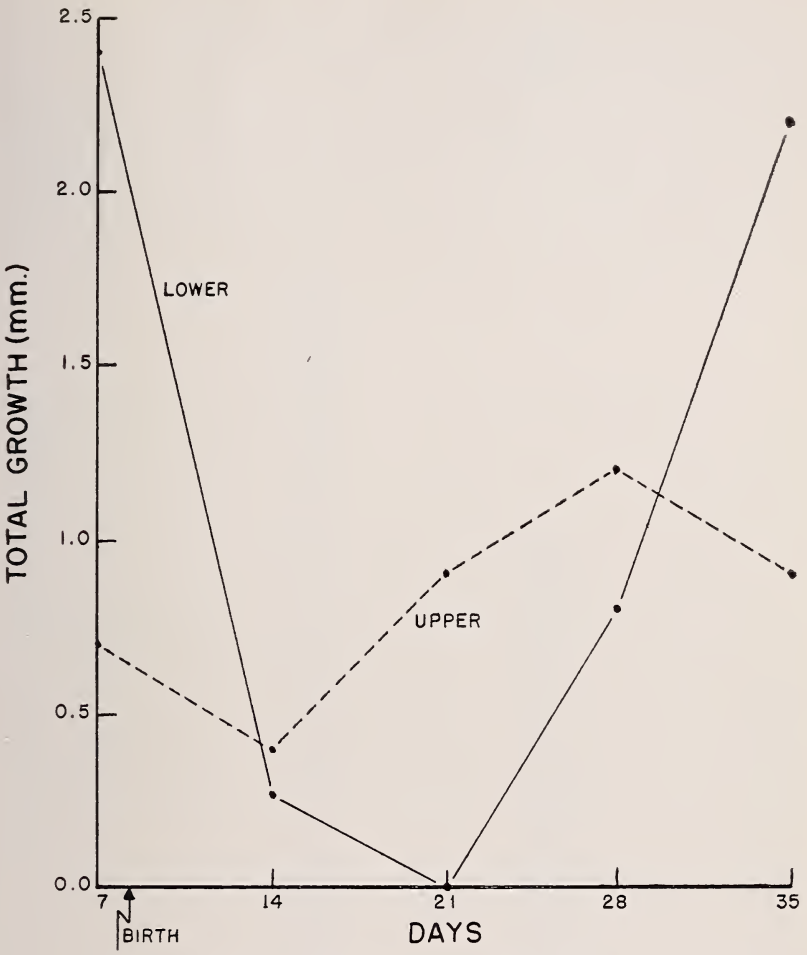



Figure 1. Incisor growth of lactating *Peromyscus gossypinus*.

The upper incisor of the pregnant cotton mouse grew 0.70 mm. and the lower, 2.40 mm. in the week prior to parturition. At the end of the following week, the upper incisor had grown only 0.40 mm. and the lower, only 0.30 mm. (Figure 1). No growth was recorded for the lower incisor during the next week, whereas the uppers resumed normal growth. During the 21-28 day period, the young began to consume small amounts of water and solid food and the lower incisor of the lactating female grew 0.80 mm.

The young were weaned by the 30th day and measurements taken on the 35th day indicated that the lower incisors were again growing at the pre-partum rate.

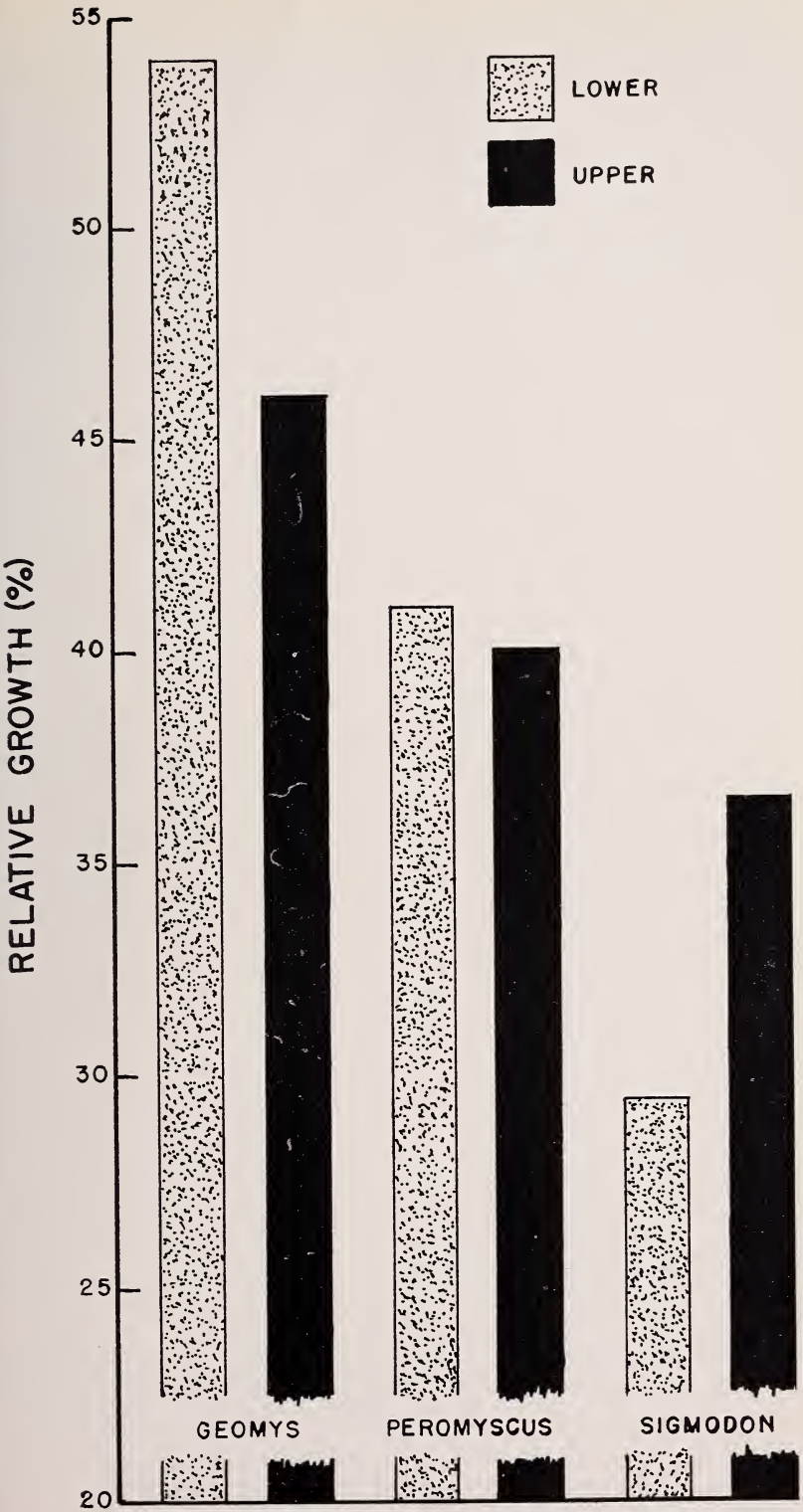
The absolute differences between the mean lower incisor rates of all three species studied were significant at the 99 per cent level. The differences between the growth rates of the upper incisors of *Geomys* and both *Sigmodon* and *Peromyscus* are also significant at the 99 per cent level, while those of the cotton rat and cotton mouse are not ($p = .60$).

## Discussion

The present data indicates that *Geomys* shares a relatively high incisor growth rate similar to *Thomomys*. However, the values reported for the western pocket gopher by Howard and Smith (1952) and Miller (1958) average slightly more (0.24 mm. per day for the upper incisors and 0.32 mm. per day for the lowers) than in the eastern form. The significance of this difference is not obvious, although it may be related to differences in diet or the soils that are inhabited. The cotton rat fell considerably below *Geomys* in its incisor growth rates, which correspond rather closely to those reported for the procupine. The rates observed in *Peromyscus* are the lowest of the three species studied. However, the differential growth rate of upper and lower incisors is less (42 per cent as compared to 52 per cent) than in *Geomys* and *Sigmodon*.

Figure 2 presents the average weekly incisor growth in the three species as a percentage of the mean length of the respective incisor in each form, thus permitting a comparison of relative incisor growth in each species. On this basis *Geomys* still exceeds the other in incisor growth rates. However, a comparison of *Peromyscus* and *Sigmodon* shows that the former replaces 40.7 per cent of the lower incisor per week and 40.0 per cent of the upper incisor, while corresponding values for *Sigmodon* are 29.3 and 36.5 per cent. Howard and Smith (1952) and Miller (1958) postulate that apparent differences in the incisor growth rates between two species of *Thomomys* were largely due to varying feeding habits. The same hypothesis appears tenable in the

Figure 2. Relative growth of incisors expressed as a percentage of total length of tooth.


55
50
45
40
35
30
25
20
RELATIVE GROWTH (%)
LOWER
UPPER
GEOMYS
PEROMYSCUS
SIGMODON

present case as the cotton rat habitually feeds on soft vegetation while the cotton mouse tends to subsist on harder fare.

In the case of the pregnant female cotton mouse studied, lactation was found to have a pronounced effect on incisor growth rates, the lowers, because of their inherently high rates, reflecting to a greater degree the influence of nursing on calcium and phosphorus levels.

## Summary

The rate of extrusive incisor growth in the rodents *Geomys pinetis, Sigmodon hispidus,* and *Peromyscus gossypinus* was studied over a 28-day period. The upper incisors of *Geomys* grew at an average rate of 2.45 mm. per week and the lowers, 4.69 mm. per week. The mean rates of upper and lower incisors of *Sigmodon* were 1.33 and 2.52 mm. per week, respectively, and for *Peromyscus,* 1.12 and 2.38 mm. Differential growth rates of the incisors in the three species were: *Geomys,* 52 per cent; *Sigmodon,* 52 per cent; and *Peromyscus,* 42 per cent.

*Geomys* exceeded the other genera in relative as well as absolute growth of incisors, while growth rates of *Peromyscus* incisors were proportionately higher than *Sigmodon.* These differences may be correlated with differences in dietary habits.

A single *Peromyscus* female exhibited a marked reduction in the growth of the lower incisors during lactation. The effect of nursing on the growth of the upper incisors was much less and of shorter duration.

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